

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

In the specification, a paragraph has been amended on page 4.

This amendment changes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

Claims 1, 3, 9 and 11 have been amended to improve their grammar without narrowing their scope. Claim 7 has been amended to use terminology consistent with claims 1 and 5, from which claim 7 ultimately depends. No new matter has been added.

After amending the claims as set forth above, claims 1-11 are now pending in this application.

Drawings

The drawing were objected to for not showing the retarding grid. Applicants have amended Figure 1 and a corresponding section of the specification to show the retarding grid, and respectfully submit that the objection to the drawings has been overcome.

Rejections under 35 U.S.C. §§ 102 and 103

Claims 1, 3, 4 and 11 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,713,542 to Campana (hereafter “Campana”). Claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Campana in view of Yunogami et al., “Development of neutral-beam-assisted etcher”, (hereafter “Yunogami”). Claims 5-7 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Campana in view of U.S. Patent No. 4,775,789 to Albridge, Jr. et al. (hereafter “Albridge”). Claim 8 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Campana in view of U.S. Patent No. 4,859,908 to Yoshida et al. (hereafter “Yoshida”). Applicants respectfully traverse these rejections for at least the following reasons.

Independent claim 1 is directed to an etching apparatus using a neutral beam. The apparatus includes a grid having a plurality of grid holes and a reflector having a plurality of reflector passages, the reflector passages communicating with the grid holes such that the ion beam passing through the grid holes is reflected by the surfaces of the reflector passages and the ion beam is neutralized into a neutral beam. Campana fails to suggest the invention of claim 1, and the remaining references cited fail to cure the deficiencies of Campana.

The Office Action equates the neutralize plate 10 and repeller grid 18 with the grid and reflector, respectively, as claimed in claim 1. Campana discloses that the neutralizer plate 10 is held at ground potential and converts an ion beam into neutral particle beam 20, and that repeller grid 18 has a potential so as to repel any remaining ions in the beam 20 back toward the plate 10 (col. 3, line 66 to col. 4, line 7). Thus, the repeller grid, in contrast to the reflector as claimed in claim 1, does not have a plurality of reflector passages that communicate with holes of the neutralize plate 10 such that the ion beam passing through the holes is reflected by the surfaces of the reflector passages and the ion beam is neutralized into a neutral beam. Instead, the repeller grid 18 acts to repel ions and eliminate them from a neutral particle beam. In other words, the repeller grid does not neutralize ions, but repels them. Therefore Campana fails to disclose the reflector as recited in claim 1.

Moreover, in the arrangement of Campana, the holes in the repeller grid 18 do not have surfaces such that the ion beam is neutralized. Instead, the grid 18 as a whole acts to repel ions.

Yunogami and Yoshida were cited for allegedly disclosing a retarding grid, and an inductively coupled ion source, respectively, but fail to cure the deficiencies of Campana.

Albridge also fails to cure the deficiencies of Campana, at least because one skilled in the art would not replace the repeller grid 18 of Campana with the plate 5 of Albridge as suggested in the Office Action. Albridge discloses directing an ionized oxygen beam 6 toward a plate 5 to strike the surface of the plate at a grazing angle θ so as to produce neutral oxygen atoms and molecules (col. 3, lines 30-40). Thus, the plate 5 of Albridge acts to neutralize oxygen ions. By contrast, the function of the repeller grid 18 of Albridge is to repel

ions, not to neutralize them. Replacing the repeller grid 18 of Campana with the plate 5 of Albridge would render the Campana device unfit for its intended purpose, which is to repel ions at the repeller grid.

Moreover, even if the repeller grid of Campana were replaced with the plates of Albridge, the resulting structure would not meet the limitations of claim 1. The reflector as claimed includes a plurality of reflector passages. By contrast the plates of Albridge do not include any reflector passages. Thus, even if the Campana device were modified to replace the repeller grid with plates, the resultant structure would not meet the limitations of claim 1.

The dependent claims ultimately depend from claim 1 and are patentable for at least the same reasons, as well as for further patentable features recited therein.

For example, claim 10 requires that an angle between a central axis of the reflector passages and the advancing direction of the ion beam is from 5 to 15°. This feature is not suggested by Campana or Albridge. The Office Action argues that the range of 5-15° would be obvious and cites to Albridge at col. 3, lines 26-55, and alleges that as the angle increases efficiency decreases. Albridge discloses, however, that the highest efficiency is for an angle of between 1 and 4° (col. 3, lines 33-34). In light of the disclosure in Albridge that the highest efficiency is for an angle of between 1 and 4°, one skilled in the art would have been lead away from increasing the angle to be between 5 and 15°.

With respect to claim 11, Campana does not disclose that a circular section of the reflector passages has a diameter which is equal to or greater than that of the grid hole. Comparing the holes of plate 10 (equated to the grid) with the holes in grid 18 (equated to the reflector), Figure 11 of Campana appears to show that the plate 10 holes are larger than the grid 18 holes. Moreover, it is improper to derive the scale of parameters from patent drawings, unless the patent expressly discloses that the drawings are to scale. Still further the holes in the grid 18 do not appear to have a circular cross section. Thus Campana fails to disclose the features of claim 11.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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FIG. 1

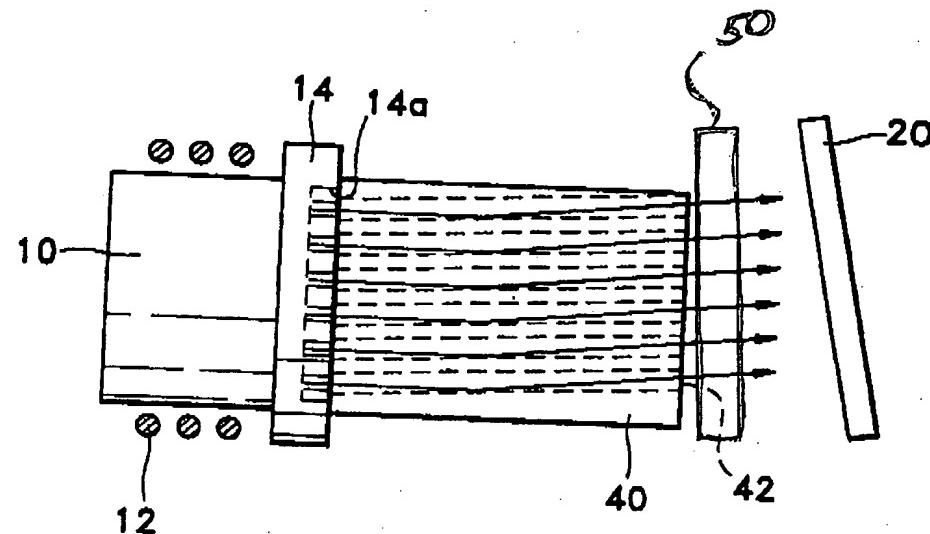


FIG. 2

